EVS

WATER

An educational package

SKN-90

for Standards 5 to 8

Centre for Environment Education
Nehru Foundation for Development, Ahmedabad

About this package

Dear Teacher,

You have before you an educational package containing a variety of material which can be used as teaching-learning aids.

The theme of the package is WATER. WHY DO WE STUDY ABOUT WATER? Millions of years ago, life began in water. All living things constantly have to seek water to survive. Three-fourths of the world is covered with water. Almost 70 per cent of the human body is made up of water.

WATER is essential for all life functions. Yet, how often during the course of our daily life do we stop to consider the role of water in the innumerable aspects of our day-to-day existence?

India has a rich natural network of water bodies — majestic rivers, jewel-like lakes, gushing waterfalls and the longest coastline. How much thought have we given to the immense potential of these water bodies? Water becomes news only when there is too much of it (floods) or too little of it (drought) or careless use of it (pollution).

It is time for us all to become aware of this precious resource, to learn more about it and to try and prevent it from being polluted.

Students learn about water at different levels and in different contexts. Each subject deals with WATER from a particular point of view.

This water package is an attempt to integrate the many aspects of this extensive subject in an interesting and informative manner. The material is not restricted to any one discipline but tries to touch upon a number of areas. Thus, they can be used in a number of different contexts. You can choose a particular component to suit what you are teaching, and where and when you think it would be most effective to supplement the teaching-learning experience for yourself and your students.

The package is not designed specifically for a particular standard. Broadly the material may be used for standards 5 to 8. You may decide on the combination and use of the material keeping in view the level of your students in terms of what they already know, their interest and the time and facilities at your disposal. You are also free to use the material with a slightly lower or higher age-group if you think it would be useful. The packet is designed to be interactive, in the sense that the students are encouraged to interact directly with the components — both visual as well as printed matter. Each teacher and each group of students can use the material/package in their own way, thereby sharing a unique experience.

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(Learning Centre)
Supported by : Swanirbhar

The Components

Activity Sheets

Participation is the key to enjoyment and enjoyment is the key to learning. The package includes activities designed to encourage maximum participation and fun for students. There are 12 activities all related to the subject of water. Information has been given about the main subject area covered by each activity, the time and equipment needed and the suitable number of students to best carry it out, and whether the activity is an outdoor or an indoor one. The activities are designed for standards 5 to 8. You would be the best judge of which are most suited to each class.

We have not sequenced the activities, so that you have the flexibility of choice. Very broadly, the activities cover three main aspects: basic uses of water, properties of water and the pollution of water. You may choose the activities which relate best to the standard and subjects you are teaching. You may also give the other activities to your colleagues who may be teaching other subjects and other standards.

The activity sheets are written in a manner that they can be understood directly by the students. You may divide your class into smaller groups and distribute the sheets to each group. They could then read the instructions, carry out the activity and record their observations. In this way, the students will have a feeling of greater participation in the exercise.

The package is not exhaustive in terms of content or components. We hope that the contents of this package will help to excite a sense of discovery in the students and thereby motivate them to undertake further enquiry. You are welcome to add much more to the basic components, to draw corollaries based on this material with other subjects — especially the other basic elements like air, soil and energy and to design similar packages for other teaching-learning areas.

We have enjoyed developing and trying the WATER PACKAGE and we hope you and your students will too. We look forward to your reactions to the package.

Information Cards

The package includes a set of cards. Each card contains information on one particular aspect of water. An attempt has been made to cover a wide range. There is information on the Water Cycle, on the Pollution of

5 73
573

Water, what each one of us can do to keep water clean and a number of other topics. You can use this information to supplement your teaching. You may also use it to complement the activities with a discussion in the classroom.

Poster

A colour poster on the theme WATER emphasizes how not only human beings, but all living things require water for survival and sustenance. Hence the slogan, WATER: SAVE SOME FOR US.

The poster is meant to be displayed in the classroom or in some place in the school where many students can see it. It can be used as a starting point for a discussion on the theme. Students may also plan a debate or a small play based on the visuals depicted on the poster — explaining how water is vital for each of the living things depicted.

Stickers

Two sheets of stickers are included. Each sheet consists of 36 stickers. There are 18 main visuals which are repeated. The visuals also are based on the main theme: WATER: SAVE SOME FOR US. In addition, each sticker has a caption which highlights an interesting and important fact about water. The stickers are meant to be distributed to the students — one to each student. They may stick it on their notebooks or any other place. They may be encouraged to write an essay based on the caption their sticker bears. It is felt that in this way, each student will have a feeling of "being a part" of the project/theme and relate to it with greater enthusiasm and involvement.

WATER FOR LIFE

1

Objective

To emphasize that water is essential for life.

Activity

Ask the students to take two pots and sow an equal number of wheat grains or mustard seeds or any other easily available seeds in each pot and water well.

Let the plants grow for a week. Now let them stop watering one of the pots and continue to observe both for a few days. Is there any difference in the plants in the two pots?

Variation/extension

A similar activity may be performed using different kinds of soil — sand, clay etc. Note that the observations will change depending on the water retention capacity of the particular soil.

Evaluation

In what way does water help plants?

Thrust area
Agriculture

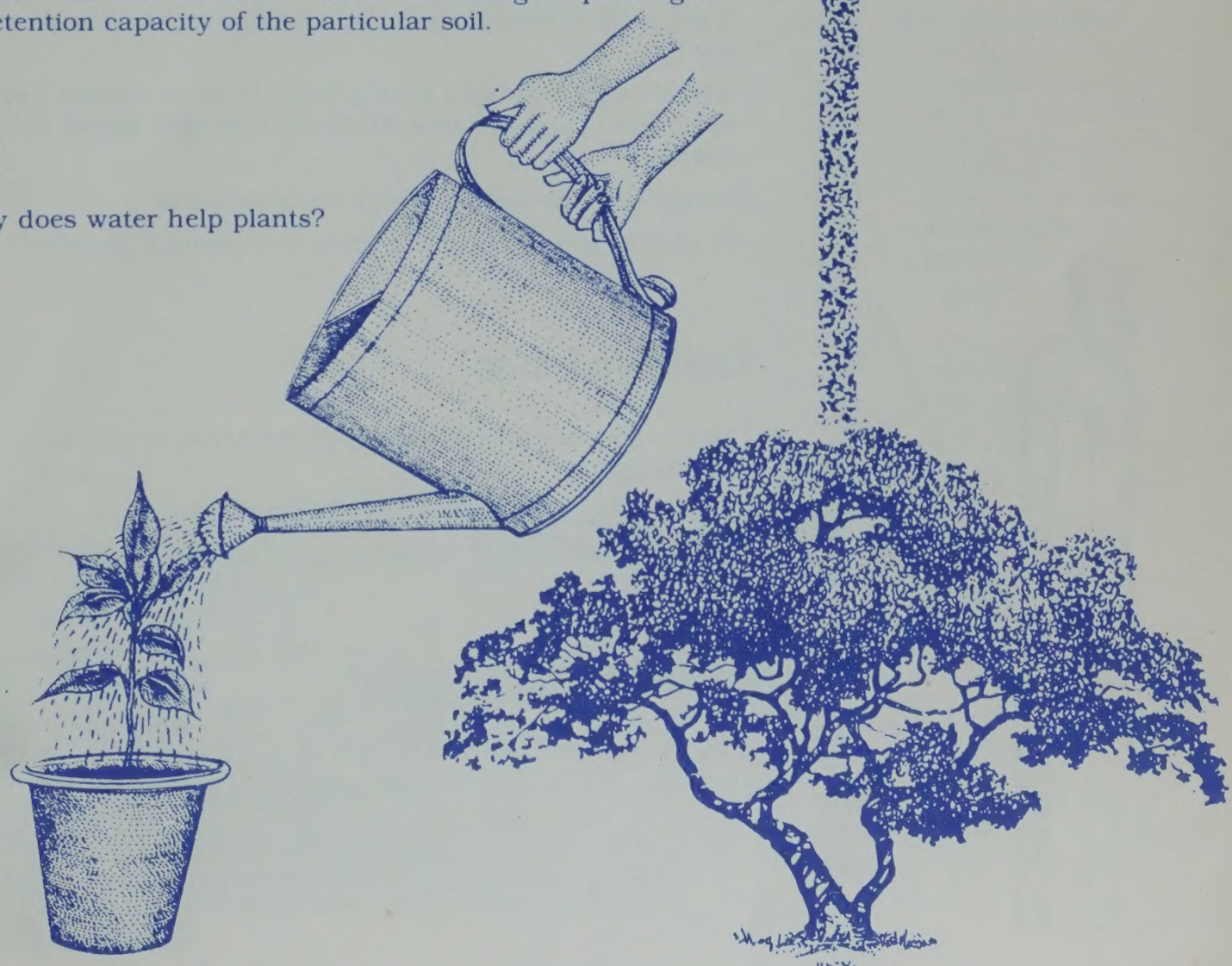
Subject
Science

Group size
4-5

Duration
8-10 days

Materials
Seeds, 2 identical pots filled with garden soil.

Prerequisite
Basic knowledge of gardening



2 WATER AT HOME

Thrust areas
Energy, Conservation, Health, Pollution

Subjects
Science, Social Studies

Places
Outdoor, Home

Group size
Entire class or individual

Duration
Several days

Suitable time/ season
Throughout the year.

Materials
None

Objectives

To know that

- Bringing water into the house involves expenditure of energy.
- Water is an important resource.
- Access to water depends on several factors.

Activity

Ask the student to observe the following:

- How does water come into the home?
- Who brings the water home?
- For what household activities is water used?
- How far is the source of water?
- Do all households in the community get water in the same manner as yours?
- Who controls the source of water? Why?
- What is the minimum quantity of water required in your home every day?
- Where water is fetched from a well : Why do women have to bring water from the well? How much time do they spend to bring the water?
- Where does the water go after household use?
- In what season do you find cases of diarrhoea, jaundice?

Variation/extension

- How to purify water if there is an incidence of diarrhoea in your community?
- How to keep the water source clean?
- What activity should not be permitted near the water source?

Evaluation

The students' answers to the above questions can be used for evaluation.

THE FORMATION OF RAIN

3

Objectives

To give students a better understanding of how water from the ocean, pond, river, etc. comes back to the ground.

Activity

- Ask the students to bring a transparent plastic bag and pour a teaspoonful of water into it.
- Tie the mouth of the bag with the thread.
- Place the bag in direct sunlight.
- Ask the students to observe beads of water forming on the top and sides of the bag.
- Ask them how these droplets got there.
- Transfer the bag to a cool place and ask them to observe what happens to the water droplets.
- Discuss evaporation and condensation of water in nature.

Thrust area

Environment

Subject

Science

Places

Classroom, Home

Group size

Individual or group

Duration

One hour

Suitable time/ season

Daytime in enough sunlight

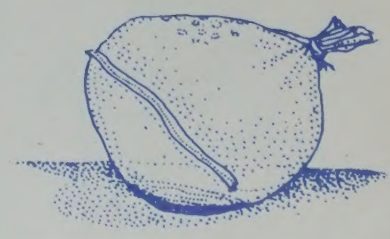
Materials

A transparent plastic bag

A piece of thread to tie the bag

Pre-requisites

The student should know that water on earth is in constant circulation called the water cycle. Water from soil, oceans, ponds, leaves of plants, etc. evaporates by getting heat from the sun. In its vapour state, water is carried through air and eventually condenses into small droplets to form clouds and from clouds the water falls back to the ground in the form of rain or snow.



4 CAN YOU SEE THROUGH ME?

Thrust area
Pollution

Subject
Science

Place
Classroom

Group size
3-5

Duration
30 minutes

Material
Two large identical buckets, thread, white paper, empty matchboxes, scale.

Objective

To compare the transparency of clear and dirty water.

Activity

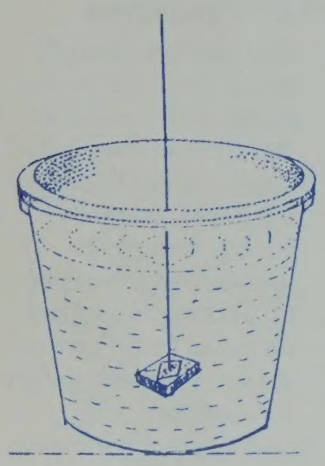
Divide the class into groups of 3 to 5. Fill one bucket with clean water (tap water may be used) and the other with dirty water (domestic waste water, industrial waste water, or water from a roadside ditch.)

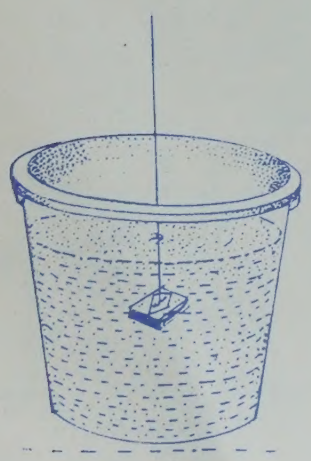
Ask each group to take an empty matchbox and fill it with small pebbles. Wrap white paper around it and tie a string around its centre. Mark the string at every one centimetre length for measurement.

Lower the box slowly into the bucket containing dirty water and watch closely. Keep on lowering it till you stop seeing the box and measure the length of the thread that has gone below the surface of the water. This length represents the transparency of the dirty water.

Repeat with the bucket containing clean water. Compare and discuss your observations.

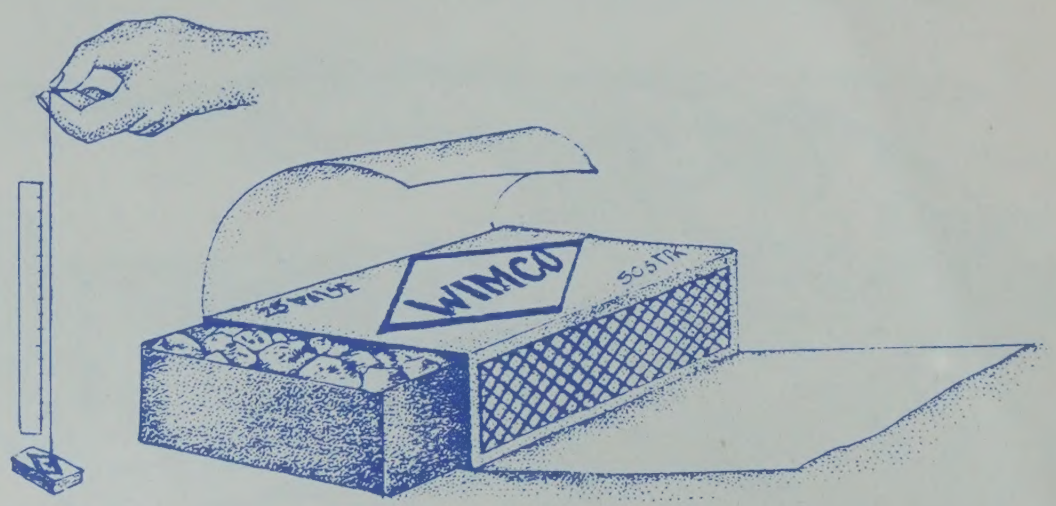
Perform both experiments a number of times, using the same buckets and water. You may change the position of the bucket or your own position around it. Are the observations the same each time? If not, why?





Variation/extension

Take two identical, transparent containers. Fill one with clean water and the other with dirty water. Place a candle at a distance of 20 cm. behind the container full of clean water. Light the candle and observe the light from the opposite side. Now repeat the same for the container containing dirty water. Do you observe any difference? If so, why?



TROUBLED WATERS

5

Objectives

To observe the movements on the surface of water and to investigate their causes.

Activity

The class should be taken out to a nearby lake, river or seashore. They should be asked to observe the different kinds of movements on the water surface and find out what causes them.

A piece of wood should be thrown onto the water and attention drawn to the fact that while the ripples or waves move on, the floating object remains in the same place. In case of streams or rivers, this observation may not hold true. Why?

Let the students note the difference in the ripples made by wind and those created by throwing a pebble or a fish coming up to the surface of the water.

Variation/extension

Take the students to a beach and ask them to observe the waves. Note that the waves approaching the shore rise higher and then break by curling over at the crests. Similar movement of water can also be observed in large reservoirs when a strong wind is blowing.

Thrust area
Environment

Subject
Science

Place
Outdoors

Group size
Entire class

Duration
45 minutes

Suitable time
When it is not raining

Materials
None

6 ENERGY IN STEAM

Thrust area
Energy

Subject
Science

Place
Classroom

Group size
Entire class

Duration
30 minutes

Materials
Aluminium kettle, cork, heating device.

Objective

To demonstrate that water in the form of steam has a lot of energy.

Activity

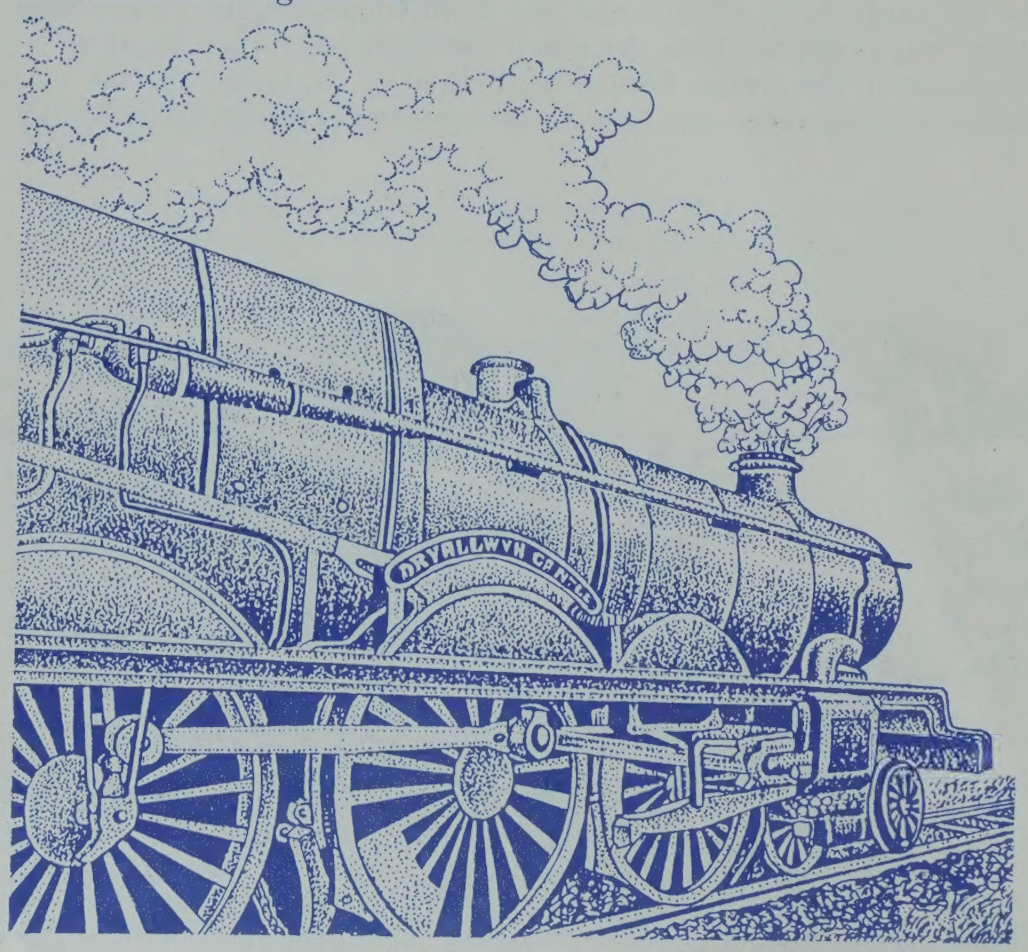
Fill the kettle with water. Secure the lid tightly by tying a piece of cloth over it. Now block the spout of the kettle with a snugly fitting cork. Keep the kettle to boil on any convenient heating device. What happens to the cork? Why?

Variation/extension

The activity may be performed using any other metal container with a lid. Why does the lid start rattling after a while?

Evaluation

How do steam engines work?



LOOKING AROUND WATER

7

Thrust areas
Environment, Habitat

Subject
Science

Place
Outdoor

Group size
Entire class

Duration
60 minutes

Materials
None

Prerequisite
Observation skills

Objective

To observe the differences in the air and soil around a water body and away from it.

Activity

Take the students on an outing to a nearby pond, lake or river and ask them to note the place from where they first feel the air becoming cooler. What could be the reason for this drop in temperature? Also ask the students to observe the soil under their feet while they walk about. Ask them to touch the soil and determine whether it is dry, wet, sticky or sandy.

Variation/extension

Ask the students if the air smells different on nearing a water body. Encourage them to observe holes or tracks in the soil around the water body. What caused these? Are these in any way related to the existence of the water body? Discuss.

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8 CLEANING WATER

Thrust areas
Pollution, Health

Subject
Science

Place
Classroom

Group size
6-8

Duration
45 minutes

Suitable time
Any time

Materials
A flower pot, cotton wool, sand, gravel, soil, charcoal or partially burnt wood, muddy water.

Prerequisite
Observation skills

Objectives

To show the students how impurities in water can be removed by filtration and how they can make a water filter.

Activity

Show the students how they can make a water filter using a flower pot in the following way:

- Ask them to wash the sand and gravel to remove clay particles. From partially burnt wood they can obtain charcoal powder.
- Let them plug the hole at the bottom of the pot with cotton wool and then spread a layer of gravel a few centimetres thick over it. Layers of similar thickness of sand and charcoal powder should then be laid over it.

Now let them pour some muddy water onto the pot without disturbing the layers. Tell them to collect the water as it trickles from the bottom of the pot.

Let them compare the water that comes from the bottom of the pot with that they had initially poured. Is it less muddy?

The students may be told that the crust of the earth is similarly made up of several layers and as the rainwater percolates through these layers and settles down over impervious rocks as groundwater reserves, it gets filtered of impurities.

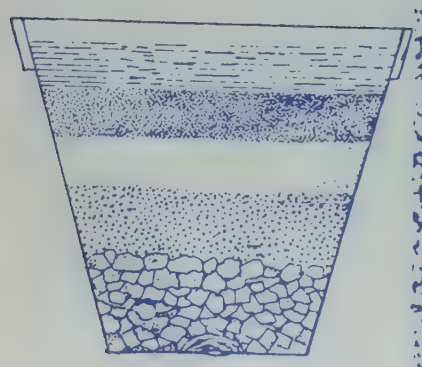
Variation/extension

The students may be asked to do the following variation of the activity:

Take three flower pots and plug the hole at the bottom of each pot with a piece of cotton.

Put gravel in the first pot, sand in the second and soil in the third. Now pour muddy water into the pots.

Compare the water coming out from the bottom of each pot. Which water is the least muddy? Which of the three materials used in the pots acts as a better water filter?



Evaluation

Ask the students which water from the following sources is safer to drink and why?

1) A tubewell drawing water from an underground reservoir
2) A lake

FLOATING ON WATER

9

Objectives

To find out how insects float on water.

Activity

Take students to a pond or still water body and show them floating insects.

Ask the students the following questions:

- How do these insects float on water?
- Why do they not sink?

Then ask them to do the following:

Fill a glass or tumbler with water. Take a blade and put it in the water vertically. Note what happens.

Now remove the blade and dry it thoroughly. Take a small piece of blotting paper or newspaper smaller than the mouth of the glass. Place the blade on it horizontally. Then place the paper and the blade very gently on the surface of the water. Observe what happens. When does the paper sink? What happens to the blade?

Variation/extension

The same experiment can also be done with a needle instead of a blade.

Evaluation

Through this experiment students understand the role of surface tension which enables some animals and objects to float on water.

Thrust areas
Ecology, Wildlife

Subject
Science

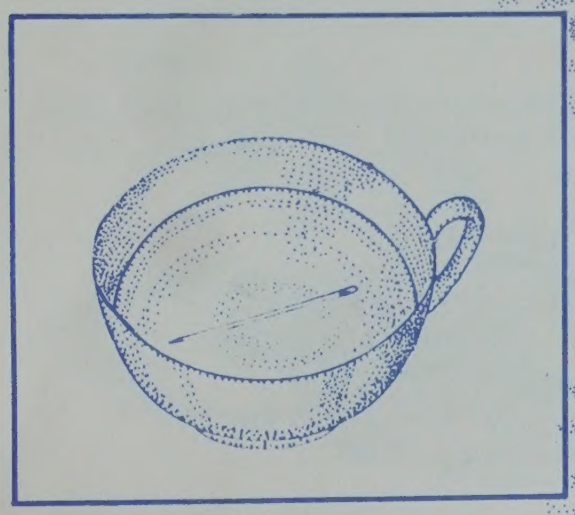
Places
Classroom, Laboratory, Outdoors, Home

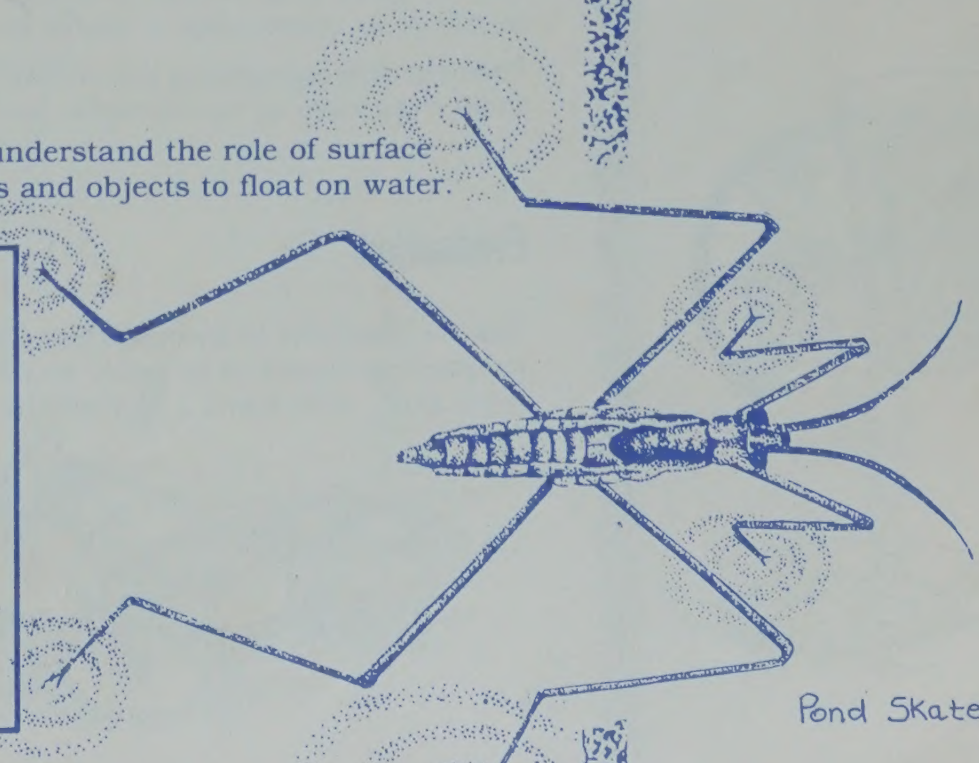
Group size
Individual or Group of 4 or 5 students

Duration
20 minutes

Materials
Shaving blade, needle, blotting paper, glass.

Pre-requisite
They should know how to handle the materials properly.





Pond Skater

10 MORE THAN MEETS THE EYE

Thrust areas
Environment, Pollution

Subject
Science

Place
Outdoors

Group size
Entire class

Duration
60 minutes

Suitable time
A hot, windy, dry day

Materials
Transparent containers, saucers

Prerequisite
Knowledge of evaporation

Objectives

To create among students an awareness that water contains dissolved and undissolved substances and to introduce the concept of water pollution.

Activity

Ask the students to collect water from different sources like a pond, a water tank, a stream, a well etc. Store the water in transparent containers.

Tell the students to observe each sample. Is the water clear or turbid? What is the colour of the water? Are there any objects floating on the surface? Ask the students to grade the water as clear, turbid or very turbid by visual comparison.

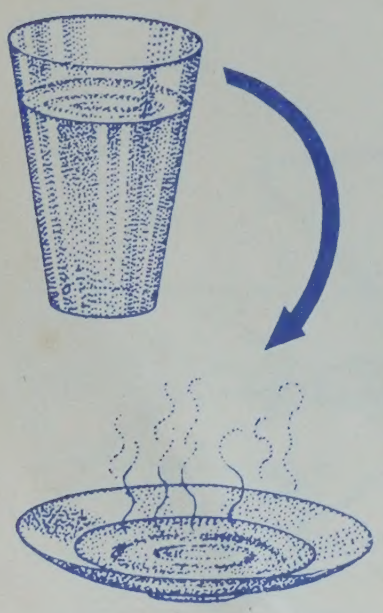
Allow the water to stand for 30 minutes and let them observe again. Are there any sediments at the bottom of the containers now?

Pour out equal amounts (say 10 teaspoonsful) of each sample into separate saucers. Place the saucers in direct sunlight until the water evaporates. Is there a residue? What could it be? Why could they not see it before?

Variation/extension

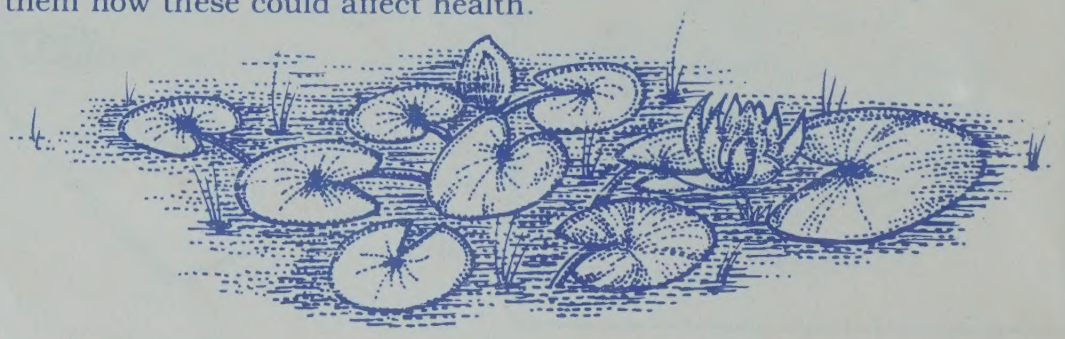
Take 5 glasses of tap water. Add a pinch of soil, a pinch of salt, one tablespoon of sugar, one tablespoon of milk and one tablespoon of ink to each glass respectively. Ask the students to note down the change in colour or appearance of water if any, in each case.

Pour the five samples of water into five separate shallow pans and let them evaporate in the sunlight. Is there any residue now?



Evaluation

Ask the students to discuss their observations and find out how some substances dissolved in water could contribute to its pollution. Ask them how these could affect health.



NOT ALL THE SAME

11

Thrust area
Environment

Subject
Science

Place
Classroom

Group size
Entire class

Duration
30 minutes

Suitable time
Any time

Materials
Soap powder

Prerequisite
Knowledge of the chemical properties of water.

Objective

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RETURN DATE SLIP

DUE DATE	DUE DATE	DUE DATE

ft water.

ıt sources like tap, well,

ɔap powder or soap flakes
difference in lather

r?

er and well water.

ınd allow to cool. Does a
What could have caused

ather formed?

washing, bathing and
cooking purposes.

12 MAKING BIRD BATHS

Thrust areas
Conservation, Wildlife

Subjects
Science, Social Studies, Maths, Craft

Places
Classroom, Outdoors, Home

Group size
5 to 6

Materials
Clay pans or metal pans, strong wires, large nail and hammer

Objectives

- To encourage students to take interest in birds.
- To provide an observation spot for better understanding of bird life.

Activity

Let students take a shallow clay pan.

Using the nail and hammer make holes in the pan as indicated in the figure.

Tie lengths of wire through these holes and hang up the bird-bath in a tree or from a rafter of the verandah. This will keep them safe from cats which might kill the birds coming to drink and bathe.

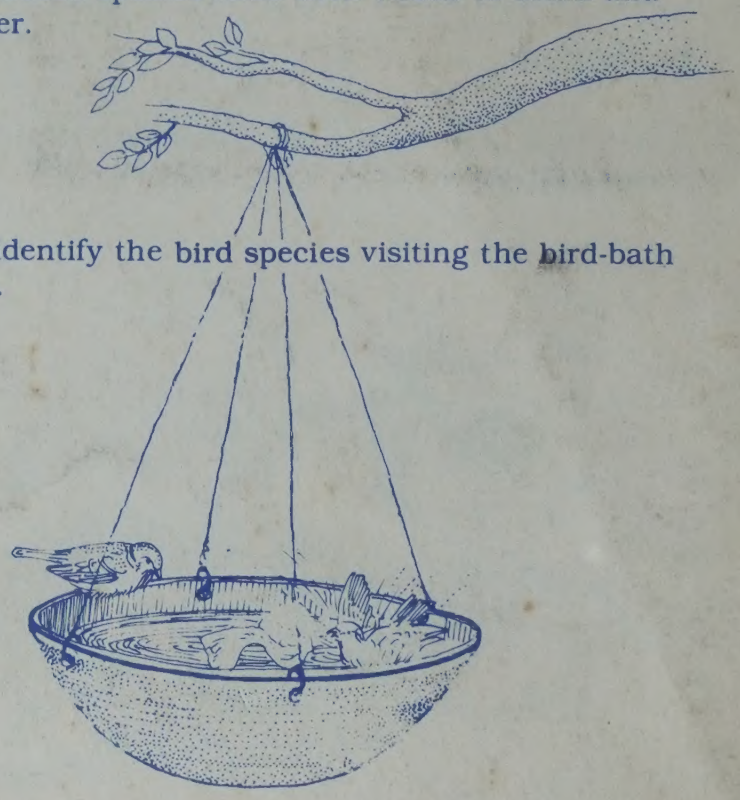
Ensure that the pan is cleaned every morning and kept filled. Students should observe the birds visiting the bird-bath and make notes of their sizes and shapes.

Along with the bird-bath, a feed-place can also be constructed to watch what food which bird takes.

Variation/extension

Ask students to draw birds, noting the important features, e.g. size, colour, shape of bill, etc.

Notes may be made of which species raise their heads to drink and which suck up the water.



Further reading

Look up bird books to identify the bird species visiting the bird-bath and the feeding station.